

(19)日本国特許庁 (J P)

(12) 公 開 特 許 公 報 (A)

(11)特許出願公開番号
特開2001-313047
(P2001-313047A)

(43)公開日 平成13年11月9日(2001.11.9)

(51)Int.Cl. ⁷	識別記号	F I	テーマコード* (参考)
H 0 1 M	8/02	H 0 1 M	8/02
	8/04	8/04	8/04

Z 5 H 0 2 6
E 5 H 0 2 7
A

審査請求 未請求 請求項の数4 O L (全 4 頁)

(21)出願番号 特願2000-130640(P2000-130640)

(22)出願日 平成12年4月28日(2000.4.28)

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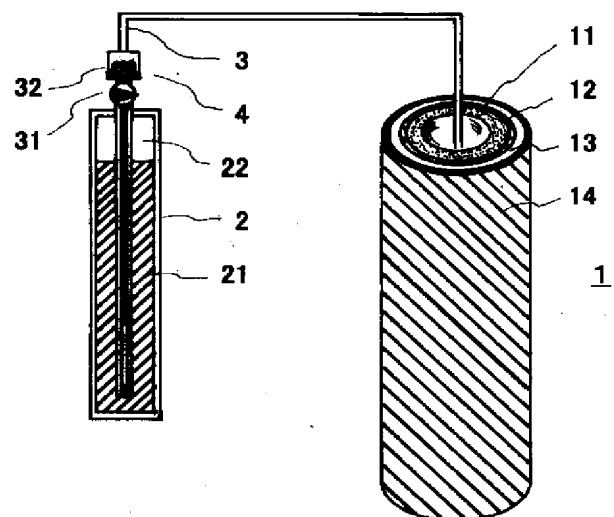
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(54)【発明の名称】 直接メタノール型燃料電池

(57)【要約】

【課題】 携帯用電子機器の電源にも使用できる直接メタノール型燃料電池を得る。

【解決手段】 筒状または有底管状の集電体11の外表面に燃料電極層12、電解質層13、空気電極層14を順次形成した燃料電池セル1と、燃料液21が充填された燃料容器2と、燃料容器2内の燃料液21を前記燃料電池セル1の筒状又は有底管状の集電体11の内側空間に供給するための燃料供給管3とを有し、前記燃料液21を不活性ガスの加圧下で燃料容器内に充填してなる。



【特許請求の範囲】

【請求項1】 筒状または有底管状の集電体の外表面に燃料電極層を形成し、この燃料電極層の外表面に電解質層を形成し、この電解質層の外表面に空気電極層を形成した燃料電池セルと、メタノールを含有する燃料液が充填された燃料容器と、前記燃料容器の燃料液を前記燃料電池セルの筒状の集電体の内側空間に供給するための燃料供給管とからなることを特徴とする直接メタノール型燃料電池。

【請求項2】 請求項1記載の直接メタノール型燃料電池において、燃料電池セルは、電解質層と空気電極層の一部が切除され、これによって露出した燃料電極層にインターコネクターが設けられていることを特徴とする直接メタノール型燃料電池。

【請求項3】 請求項1または2記載の直接メタノール型燃料電池において、集電体は多孔質カーボンチューブからなることを特徴とする直接メタノール型燃料電池。

【請求項4】 請求項1～3のいずれか一項記載の直接メタノール型燃料電池において、燃料液は不活性ガスの加圧下で燃料容器内に充填されるとともに、燃料供給管と燃料容器とが圧力調整手段を介して接続されていることを特徴とする直接メタノール型燃料電池。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は直接メタノール型燃料電池に関するもので、さらに詳しく言えば、携帯電話やノート型パソコンなどの携帯用電子機器の電源として用いられるのに適した直接メタノール型燃料電池に関するものである。

【0002】

【従来の技術】燃料電池は、燃料電極層、電解質層および空気電極層が積層された燃料電池セルと、燃料電極層に還元剤としての燃料を供給するための燃料供給部と、空気電極層に酸化剤としての空気を供給するための空気供給部とからなり、水素、天然ガス等の燃料と空気中の酸素とによって燃料電池セル内で電気化学反応を生じさせ、外部に電力を得るようにした電池であり、種々の形式のものが大規模な発電プラント用として開発が進められている。

【0003】また、近年、環境問題や省エネルギーに対する意識の高まりにより、クリーンなエネルギー源としての燃料電池を、前述した大規模な発電プラント以外の用途に用いることが検討されており、特開平9-92318号公報に開示されたような可搬形のもの、特開平5-258760号公報や特開平5-307970号公報に開示されたような、メタノールと水を含む液体燃料を直接供給するだけで発電できる直接メタノール型燃料電池が注目されてきている。

【0004】

【発明が解決しようとする課題】ところが、上記した特

開平9-92318号公報に開示された可搬形のものは、燃料としての水素を充填した水素ボンベを収納するための水素ボンベ収納部や燃料電池本体などを収納するための収納部を備えた規模のものであり、携帯電話やノート型パソコンなどの携帯用電子機器の電源に適用するのは困難であり、上記した特開平5-258760号公報や特開平5-307970号公報に開示された直接メタノール型燃料電池は、電池そのものが大きく、燃料や空気の供給機構などの補助機能が複雑であるため、そのままでは前述した携帯用電子機器の電源に用いることは困難であるという問題があった。

【0005】

【課題を解決するための手段】上記課題を解決するため、請求項1記載の直接メタノール型燃料電池は、筒状または有底管状の集電体の外表面に燃料電極層を形成し、この燃料電極層の外表面に電解質層を形成し、この電解質層の外表面に空気電極層を形成した燃料電池セルと、メタノールを含有する燃料液が充填された燃料容器と、前記燃料容器の燃料液を前記燃料電池セルの筒状の集電体の内側空間に供給するための燃料供給管とからなることを特徴とするものであり、これにより、携帯用電子機器の電源に適した電池を得ることができる。

【0006】また、請求項2記載の発明は、請求項1記載の直接メタノール型燃料電池において、燃料電池セルは、電解質層と空気電極層の一部が切除され、これによって露出した燃料電極層にインターコネクターが設けられていることを特徴とするものであり、これにより、燃料電池セルの燃料電極層と空気電極層とを簡素な形で外部回路に接続することができる。

【0007】また、請求項3記載の発明は、請求項1または2記載の直接メタノール型燃料電池において、集電体は多孔質カーボンチューブからなることを特徴とするものであり、これにより、導電性、電気化学的安定性にすぐれた電池を得ることができる。

【0008】また、請求項4記載の発明は、請求項1～3のいずれか一項記載の直接メタノール型燃料電池において、燃料液は不活性ガスの加圧下で燃料容器内に充填されるとともに、燃料供給管と燃料容器とが圧力調整手段を介して接続されていることを特徴とするものであり、これにより、圧力調整手段によって燃料容器内の圧力を調整するだけで燃料液を燃料電池セルの筒状または有底管状の集電体の内側空間から燃料電極層に供給することができるので、前述した複雑な補助機能を必要としない直接メタノール型燃料電池を得ることができる。

【0009】

【発明の実施の形態】以下、本発明を実施の形態に基づいて説明する。

【0010】図1は本発明の実施の形態に係る直接メタノール型燃料電池の斜視図および断面図である。

【0011】図1の実施の形態に係る直接メタノール型

燃料電池の特徴は、筒状の集電体11と、この集電体11の外表面に形成された燃料電極層12と、この燃料電極層12の外表面に形成された電解質層13と、この電解質層13の外表面に形成された空気電極層14とからなる燃料電池セル1と、メタノールと水からなる燃料液21が充填された燃料容器2とが、燃料供給管3によって接続され、前記燃料液21が燃料電極層12の表面に供給できるようにしたことである。

【0012】そして、前記燃料供給管3には、圧力調整手段4を設け、この圧力調整手段4を介して燃料液21を燃料電極層12の表面に供給できるようにしている。

【0013】前記燃料電池セル1の、集電体11としては多孔質カーボンチューブがよく、燃料電極層12としては白金-ルテニウム触媒をナフィオン水溶液中に分散させたスラリーを前記集電体11の表面に塗布して乾燥させたものがよく、電解質層13としては前記ナフィオン電解質のようなプロトン伝導性または水酸化物イオン伝導性のイオン交換膜がよく、空気電極層14としては白金を担持した炭素粉末を前記ナフィオン水溶液中に分散させたスラリーを前記電解質層13の表面に塗布して乾燥させたものがよい。

【0014】前記燃料容器2、燃料供給管3の材質は耐久性にすぐれたステンレス製のものがよく、燃料電池セル1に対して供給すべき燃料液21の量、すなわち得ようとする燃料電池セル1の容量によってその外形寸法を定めればよい。

【0015】前記集電体11としての多孔質カーボンチューブは、その直径を小さくし、容器内に多数を収納すれば、燃料電池セル1の出力密度を増加させることができる。また、その形状は、有底管状のものであってもよい。

【0016】前記圧力調整手段4としては、図示したように、窒素、アルゴン、ヘリウムなどの不活性ガスの加圧下でメタノールと水からなる燃料液21を燃料容器2内に充填する際に、該燃料容器2内に不活性ガス溜まり22が形成されるようにし、前記燃料容器2の近傍の燃料供給管3にバルブ31を設けて、このバルブ31を調整することによって適量の燃料液21が燃料電池セル1に送出されるようにするか、燃料電池セル1側の燃料供給管3と燃料容器2側の燃料供給管3とがコネクター32によって接続される構成にし、このコネクター32に圧力調整機能を持たせて適量の燃料液21が燃料電池セル1に送出されるようにすればよいが、バルブ31とコネクター32の両方を設けてもよい。

【0017】図2は本発明の他の実施の形態に係る直接メタノール型燃料電池の斜視図および断面図である。

【0018】図2の実施の形態に係る直接メタノール型燃料電池の特徴は、図1の実施の形態に対し、電解質層13と空気電極層14の一部が切除され、これによって露出した燃料電極層12にインターコネクター15が設

けられていることであり、燃料電極層12と空気電極層14とを簡素な形で外部回路に接続することができ、これ以外の構成は図1のものと同じである。

【0019】

【実施例】上記した各実施の形態に対し、以下のような実施例がある。すなわち、図3の実施例は、図1の実施の形態に対し、燃料容器2とこれに設けた圧力調整手段4の構成を異ならせたものである。

【0020】すなわち、図3に示した圧力調整手段4は、燃料容器2内に蛇腹状の不活性ガス室23を設け、この不活性ガス室23内の圧力をバルブ31またはコネクター32の少なくとも一方を調整することによって適量の燃料液21が燃料電池セル1に送出されるようにしたことを特徴とする。

【0021】図3の実施例は図1の実施の形態に対するものであるが、図2の実施の形態に対するものであっても同様であることは言うまでもない。

【0022】また、図4の実施例は、図1の実施の形態に対し、燃料容器2とこれに設けた圧力調整手段4の構成を、さらに異ならせたものである。

【0023】すなわち、図4に示した圧力調整手段4は、燃料容器2内に不活性ガス溜まり22が形成されるようにしている点は図1または図2のものと同じであるが、燃料容器2に手動式の加圧弁24を設け、前記不活性ガス溜まり22内の圧力を前記加圧弁24とバルブ31またはコネクター32の少なくとも一方を調整することによって適量の燃料液21が燃料電池セル1に送出されるようにしたことを特徴とする。

【0024】図4の実施例は図1の実施の形態に対するものであるが、図2の実施の形態に対するものであっても同様であることは言うまでもない。

【0025】

【発明の効果】上記した如く、本発明の直接メタノール型燃料電池は、燃料電池セルが筒状または有底管状の集電体の外表面に、燃料電極層、電解質層、空気電極層を形成したものであり、その筒状または有底管状の集電体の内側空間に燃料容器から燃料供給管を介して燃料液を供給するようにするとともに、前記燃料液を不活性ガスの加圧下で燃料容器内に充填しているから、複雑な補助機能を必要としない簡素な構成にすることができ、携帯用電子機器の電源にも使用することができ、直接メタノール型燃料電池の用途の拡大に寄与することができる。

【図面の簡単な説明】

【図1】本発明の実施の形態に係る直接メタノール型燃料電池の斜視図および断面図である。

【図2】本発明の他の実施の形態に係る直接メタノール型燃料電池の斜視図および断面図である。

【図3】本発明の実施の形態に対する実施例に係る直接メタノール型燃料電池の斜視図および断面図である。

【図4】本発明の実施の形態に対する他の実施例に係る

直接メタノール型燃料電池の斜視図および断面図である。

【符号の説明】

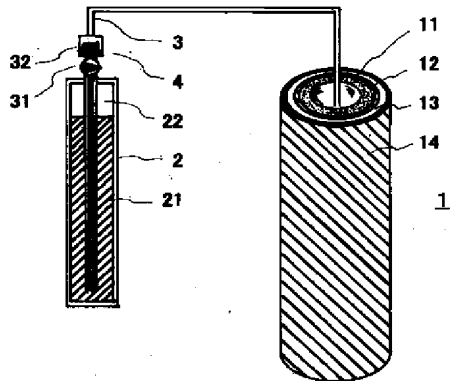
1 燃料電池セル

2 燃料容器

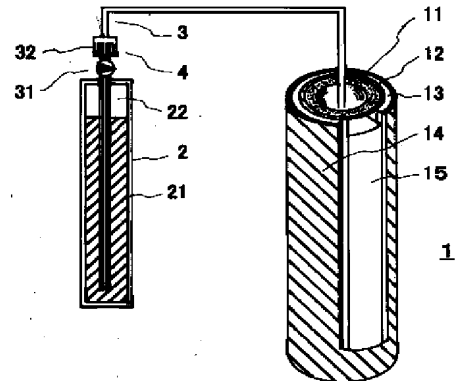
3 燃料供給管

4 圧力調整手段

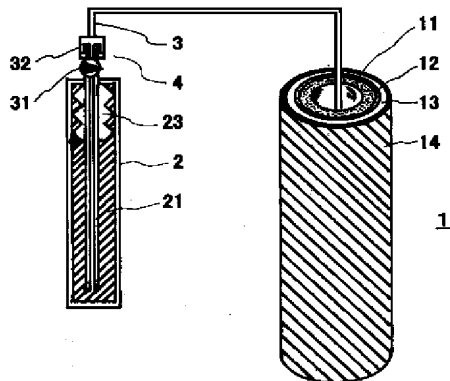
【図1】



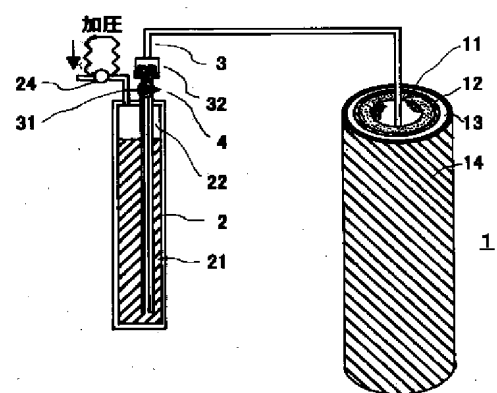
【図2】



【図3】



【図4】



フロントページの続き

Fターム(参考) 5H026 AA08 CV02 CX05 CX06 EE02
EE05 EE08 EE18 EE19
5H027 AA08 DD00 MM09



OrderPatent

(19)



JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: 2001313047 A

(43) Date of publication of application: 09.11.2001

(51) Int. Cl. H01M 8/02
H01M 8/04

(21) Application number: 2000130540

(22) Date of filing: 28.04.2000

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(72) Inventor: NAKAMURA SATORU

OKUYAMA RYOICHI

MOTOI MASASHI

(54) DIRECT METHANOL FUEL CELL

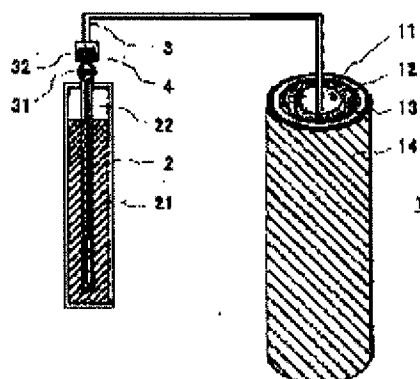
surized inert gas.

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(57) Abstract:

PROBLEM TO BE SOLVED: To provide a direct methanol fuel cell usable as a power source of portable electronic device.

SOLUTION: The direct methanol fuel cell comprises a fuel cell 1 with a fuel electrode layer 12, an electrolyte layer 13, and an air electrode layer 14 formed in this sequence on the outer surface of a current collector 11 with the shape of cylinder or pipe with bottom, a fuel container 2 filled with liquid fuel 21, and a fuel supplying pipe 3 supplying the liquid fuel 21 in the fuel container 2 to the inner space of the current collector 11 with the shape of cylinder or pipe with bottom, and the liquid fuel 21 is filled in the fuel container by pres-



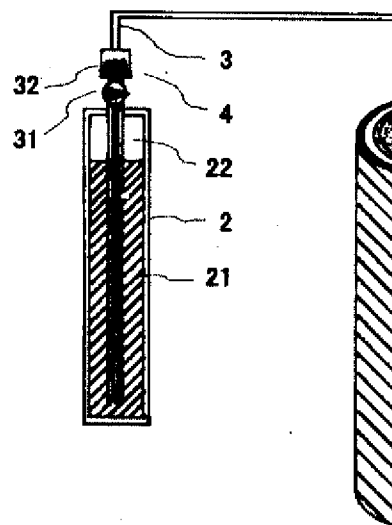
JAPANESE [JP,2001-313047,A]

CLAIMS DETAILED DESCRIPTION
TECHNICAL FIELD PRIOR ART EFFECT OF
THE INVENTION TECHNICAL PROBLEM
MEANS EXAMPLE DESCRIPTION OF
DRAWINGS DRAWINGS

[Translation done.]

Drawing selection

Representative drawing



[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] A direct methanol fuel cell comprising:

A fuel cell cell which formed a fuel electrode layer in an outside surface of a charge collector of tubed or the shape of a tube with bottom, formed an electrolyte layer in an outside surface of this fuel electrode layer, and formed an air electrode layer in an outside surface of this electrolyte layer.

A fuel container in which it filled up with fuel liquid containing methanol.

A fuel feeding pipe for supplying fuel liquid of said fuel container to inner space of a tubed charge collector of said fuel cell cell.

[Claim 2] A direct methanol fuel cell, wherein interconnector is provided in a fuel electrode layer which a part of electrolyte layer and air electrode layer were excised, and exposed a fuel cell cell by this in the direct methanol fuel cell according to claim 1.

[Claim 3] A direct methanol fuel cell, wherein a charge collector consists of a porosity carbon tube in the direct methanol fuel cell according to claim 1 or 2.

[Claim 4] A direct methanol fuel cell while fuel liquid is filled up with the bottom of application of pressure of inactive gas in a fuel container in a direct methanol fuel cell of claim 1-3 given in any 1 paragraph, wherein a fuel feeding pipe and a fuel container are connected via a pressure regulation means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a direct methanol fuel cell, and if it says in more detail, it relates to a direct methanol fuel cell suitable for being used as a power supply of portable electronic devices, such as a cellular phone and a notebook sized personal computer.

[0002]

[Description of the Prior Art] The fuel cell cell by which the fuel electrode layer, the electrolyte layer, and the air electrode layer were laminated as for the fuel cell, It consists of fuel supply parts for supplying the fuel as a reducing agent to a fuel electrode layer, and an air supply part for supplying the air as an oxidizer to an air electrode layer, It is the cell which produces electrochemical reaction within a fuel cell cell, and obtained electric power outside by fuel, such as hydrogen and natural gas, and oxygen in the air.

Development is furthered as an object for power generating plants with a large-scale thing of various forms.

[0003] By the rise of consciousness to recent years, an environmental problem, or energy saving. Using the fuel cell as a clean energy source for uses other than the large-scale power generating plant mentioned above is examined, The direct methanol fuel cell which can be generated only by carrying out direct supply of methanol which was indicated by the thing, JP,5-258760,A, and JP,5-307970,A of the portable type which was indicated by JP,9-92318,A, and the liquid fuel containing water has attracted attention.

[0004]

[Problem(s) to be Solved by the Invention] However, the thing of a portable form indicated by above-mentioned JP,9-92318,A, It is a thing of the scale provided with the stowage for storing a hydrogen cylinder stowage, a fuel cell body, etc. for storing the hydrogen cylinder filled up with the hydrogen which carries out fuel, It is difficult to apply to the power supply of

portable electronic devices, such as a cellular phone and a notebook sized personal computer, The direct methanol fuel cell indicated by above-mentioned JP,5-258760,A and JP,5-307970,A, Since the cell itself was large and the auxiliary functions, such as fuel and an air supply mechanism, were complicated, there was a problem that it was difficult to use for the power supply of the portable electronic device mentioned above, as it was.

[0005]

[Means for Solving the Problem]In order to solve an aforementioned problem, the direct methanol fuel cell according to claim 1, A fuel cell cell which formed a fuel electrode layer in an outside surface of a charge collector of tubed or the shape of a tube with bottom, formed an electrolyte layer in an outside surface of this fuel electrode layer, and formed an air electrode layer in an outside surface of this electrolyte layer, It can be characterized by consisting of a fuel container in which it filled up with fuel liquid containing methanol, and a fuel feeding pipe for supplying fuel liquid of said fuel container to inner space of a tubed charge collector of said fuel cell cell, and, thereby, a cell suitable for a power supply of a portable electronic device can be obtained.

[0006]In the direct methanol fuel cell according to claim 1, the invention according to claim 2 a fuel cell cell, A part of electrolyte layer and air electrode layer can be excised, it can be characterized by providing interconnector in a fuel electrode layer exposed by this, and, thereby, a fuel electrode layer and an air electrode layer of a fuel cell cell can be connected to an external circuit in a simple form. [0007]In the direct methanol fuel cell according to claim 1 or 2, the invention according to claim 3 can be characterized by a charge collector consisting of a porosity carbon tube, and, thereby, can obtain a cell excellent in conductivity and electrochemical stability.

[0008]In a direct methanol fuel cell of claim 1-3 given in any 1 paragraph, while being filled up with the bottom of application of pressure of inactive gas in a fuel container, the invention according to claim 4 fuel liquid, It is characterized by connecting a fuel feeding pipe and a fuel container via a pressure regulation means, and by this, Since fuel liquid can be supplied to a fuel electrode layer from inner space of a charge collector of tubed [of a fuel cell cell], or the shape of a tube with bottom only by adjusting a pressure in a fuel container with a pressure regulation means, a direct methanol fuel cell which does not need a complicated auxiliary function mentioned above can be obtained. [0009]

[Embodiment of the Invention]Hereafter, this invention is explained based on an embodiment.

[0010]Drawing 1 is the perspective view and sectional view of a direct methanol fuel cell concerning an embodiment of the invention.

[0011]The feature of the direct methanol fuel cell concerning the embodiment of drawing 1, The tubed charge collector 11 and the fuel electrode layer 12 formed in the outside surface of this charge collector 11, The fuel cell cell 1 which consists of the electrolyte layer 13 formed in the outside surface of this fuel electrode layer 12, and the air electrode layer 14 formed in the outside surface of this electrolyte layer 13, It is that the fuel container 2 in

which it filled up with the fuel liquid 21 which consists of methanol and water is connected by the fuel feeding pipe 3, and said fuel liquid 21 enabled it to supply the surface of the fuel electrode layer 12.

[0012] And the pressure regulation means 4 is formed in said fuel feeding pipe 3, and it enables it to supply the fuel liquid 21 to the surface of the fuel electrode layer 12 via this pressure regulation means 4.

[0013] As the charge collector 11 of said fuel cell cell 1, a porosity carbon tube is good, What applied to the surface of said charge collector 11 the slurry which distributed the platinum-ruthenium catalyst in NaOH solution as the fuel electrode layer 12, and was dried is good, The ion-exchange membrane of proton conductivity like said NaOH electrolyte as the electrolyte layer 13 or hydroxide ion conductivity is good, What applied to the surface of said electrolyte layer 13 the slurry which distributed the end of carbon powder platinum was supported as the air electrode layer 14 in said NaOH solution, and was dried is good.

[0014] The thing excellent in endurance made from stainless steel of the construction material of said fuel container 2 and the fuel feeding pipe 3 is good, and what is necessary is just to define the outside dimension with the quantity of the fuel liquid 21 which should be supplied to the fuel cell cell 1, i.e., the capacity of the fuel cell cell 1 made probably like.

[0015] If the porosity carbon tube as said charge collector 11 makes the diameter small and a large number are stored in a container, it can make the power density of the fuel cell cell 1 increase. The shape may be a tube-with-bottom-like thing.

[0016] As illustrated as said pressure regulation means 4, when filling up the fuel liquid 21 which consists of methanol and water with the bottom of the application of pressure of inactive gas, such as nitrogen, argon, and helium, in the fuel container 2, The inactive defects of gas accumulation 22 are formed in this fuel container 2, and the valve 31 is formed in the fuel feeding pipe 3 near said fuel container 2, . [whether optimum dose of fuel liquid 21 is sent out to the fuel cell cell 1 by adjusting this valve 31, and] The fuel feeding pipe 3 by the side of the fuel cell cell 1 and the fuel feeding pipe 3 by the side of the fuel container 2 have composition connected by the connector 32, Although a pressure regulation function is given to this connector 32 and optimum dose of fuel liquid 21 should just be sent out to the fuel cell cell 1, both the valve 31 and the connector 32 may be formed.

[0017] Drawing 2 is the perspective view and sectional view of a direct methanol fuel cell concerning other embodiments of this invention.

[0018] The feature of the direct methanol fuel cell concerning the embodiment of drawing 2, A part of electrolyte layer 13 and air electrode layer 14 are excised to the embodiment of drawing 1, It is that the interconnector 15 is formed in the fuel electrode layer 12 exposed by this, and the fuel electrode layer 12 and the air electrode layer 14 can be connected to an external circuit in a simple form, and the composition of those other than this is the same as the thing of drawing 1.

[0019]

[Example] There are the following examples to each above-mentioned embodiment. That is, the example of drawing 3 changes the composition of the fuel container 2 and the pressure regulation means 4 formed in this to the embodiment of drawing 1.

[0020] Namely, the pressure regulation means 4 shown in drawing 3 forms the inactive gas room 23 of bellows shape in the fuel container 2, Optimum dose of fuel liquid 21 was sent out to the fuel cell cell 1 by adjusting either [at least] the valve 31 or the connector 32 in the pressure in this inactive gas room 23.

[0021] It cannot be overemphasized that the example of drawing 3 is the same to the embodiment of drawing 2 even if to the embodiment of drawing 1 although.

[0022] The example of drawing 4 changes further the composition of the fuel container 2 and the pressure regulation means 4 formed in this to the embodiment of drawing 1.

[0023] Namely, although the point that the inactive defects of gas accumulation 22 are made to be formed in the fuel container 2 is the same as the thing of drawing 1 or drawing 2, the pressure regulation means 4 shown in drawing 4, The pressurizing valve 24 of a manual type is formed in the fuel container 2, and optimum dose of fuel liquid 21 was sent out to the fuel cell cell 1 in the pressure in said inactive defects of gas accumulation 22 by adjusting either [at least] said pressurizing valve 24, the valve 31 or the connector 32.

[0024] It cannot be overemphasized that the example of drawing 4 is the same to the embodiment of drawing 2 even if to the embodiment of drawing 1 although.

[0025]

[Effect of the Invention] As described above, the direct methanol fuel cell of this invention, A fuel cell cell to the outside surface of the charge collector of tubed or the shape of a tube with bottom A fuel electrode layer, While forming an electrolyte layer and an air electrode layer and supplying fuel liquid to the inner space of the charge collector of tubed [the] or the shape of a tube with bottom via a fuel feeding pipe from a fuel container, Since said fuel liquid is ~~filled~~ed up with the bottom of the application of pressure of inactive gas in a fuel container, it can have simple composition which does not need a complicated auxiliary function, can be used also for the power supply of a portable electronic device, and can contribute to expansion of the use of a direct methanol fuel cell.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to a direct methanol fuel cell, and if it says in more detail, it relates to a direct methanol fuel cell suitable for being used as a power supply of portable electronic devices, such as a cellular phone and a notebook sized personal computer.

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PRIOR ART

[Description of the Prior Art] The fuel cell cell by which the fuel electrode layer, the electrolyte layer, and the air electrode layer were laminated as for the fuel cell, It consists of fuel supply parts for supplying the fuel as a reducing agent to a fuel electrode layer, and an air supply part for supplying the air as an oxidizer to an air electrode layer, It is the cell which produces electrochemical reaction within a fuel cell cell, and obtained electric power outside by fuel, such as hydrogen and natural gas, and oxygen in the air.

Development is furthered as an object for power generating plants with a large-scale thing of various forms.

[0003] By the rise of consciousness to recent years, an environmental problem, or energy saving. Using the fuel cell as a clean energy source for uses other than the large-scale power generating plant mentioned above is examined, The direct methanol fuel cell which can be generated only by carrying out direct supply of methanol which was indicated by the thing, JP,5-258760,A, and JP,5-307970,A of the portable type which was indicated by JP,9-92318,A, and the liquid fuel containing water has attracted attention.

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EFFECT OF THE INVENTION

[Effect of the Invention] As described above, the direct methanol fuel cell of this invention, A fuel cell cell to the outside surface of the charge collector of tubed or the shape of a tube with bottom A fuel electrode layer, While forming an electrolyte layer and an air electrode layer and supplying fuel liquid to the inner space of the charge collector of tubed [the] or the shape of a tube with bottom via a fuel feeding pipe from a fuel container, Since said fuel liquid is filled up with the bottom of the application of pressure of inactive gas in a fuel container, it can have simple composition which does not need a complicated auxiliary function, can be used also for the power supply of a portable electronic device, and can contribute to expansion of the use of a direct methanol fuel cell.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, the thing of a portable form indicated by above-mentioned JP,9-92318,A, It is a thing of the scale provided with the stowage for storing a hydrogen cylinder stowage, a fuel cell body, etc. for storing the hydrogen cylinder filled up with the hydrogen which carries out fuel, It is difficult to apply to the power supply of portable electronic devices, such as a cellular phone and a notebook sized personal computer, The direct methanol fuel cell indicated by above-mentioned JP,5-258760,A and JP,5-307970,A, Since the cell itself was large and the auxiliary functions, such as fuel and an air supply mechanism, were complicated, there was a problem that it was difficult to use for the power supply of the portable electronic device mentioned above, as it was.

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MEANS

[Means for Solving the Problem] In order to solve an aforementioned problem, the direct methanol fuel cell according to claim 1, A fuel cell cell which formed a fuel electrode layer in an outside surface of a charge collector of tubed or the shape of a tube with bottom, formed an electrolyte layer in an outside surface of this fuel electrode layer, and formed an air electrode layer in an outside surface of this electrolyte layer, It can be characterized by consisting of a fuel container in which it filled up with fuel liquid containing methanol, and a fuel feeding pipe for supplying fuel liquid of said fuel container to inner space of a tubed charge collector of said fuel cell cell, and, thereby, a cell suitable for a power supply of a portable electronic device can be obtained.

[0006] In the direct methanol fuel cell according to claim 1, the invention according to claim 2 a fuel cell cell, A part of electrolyte layer and air electrode layer can be excised, it can be characterized by providing interconnector in a fuel electrode layer exposed by this, and, thereby, a fuel electrode layer and an air electrode layer of a fuel cell cell can be connected to an external circuit in a simple form. [0007] In the direct methanol fuel cell according to claim 1 or 2, the invention according to claim 3 can be characterized by a charge collector consisting of a porosity carbon tube, and, thereby, can obtain a cell excellent in conductivity and electrochemical stability.

[0008] In a direct methanol fuel cell of claim 1-3 given in any 1 paragraph, while being filled up with the bottom of application of pressure of inactive gas in a fuel container, the invention according to claim 4 fuel liquid, It is characterized by connecting a fuel feeding pipe and a fuel container via a pressure regulation means, and by this, Since fuel liquid can be supplied to a fuel electrode layer from inner space of a charge collector of tubed [of a fuel cell cell], or the shape of a tube with bottom only by adjusting a pressure in a fuel container with a pressure regulation means, a direct methanol fuel cell which does not need a complicated auxiliary function mentioned above can be obtained. [0009]

[Embodiment of the Invention] Hereafter, this invention is explained based on an embodiment.

[0010] Drawing 1 is the perspective view and sectional view of a direct methanol fuel cell

concerning an embodiment of the invention.

[0011]The feature of the direct methanol fuel cell concerning the embodiment of drawing 1, The tubed charge collector 11 and the fuel electrode layer 12 formed in the outside surface of this charge collector 11, The fuel cell cell 1 which consists of the electrolyte layer 13 formed in the outside surface of this fuel electrode layer 12, and the air electrode layer 14 formed in the outside surface of this electrolyte layer 13, It is that the fuel container 2 in which it ~~filled~~ed up with the fuel liquid 21 which consists of methanol and water is connected by the fuel feeding pipe 3, and said fuel liquid 21 enabled it to supply the surface of the fuel electrode layer 12.

[0012]And the pressure regulation means 4 is formed in said fuel feeding pipe 3, and it enables it to supply the fuel liquid 21 to the surface of the fuel electrode layer 12 via this pressure regulation means 4.

[0013]As the charge collector 11 of said fuel cell cell 1, a porosity carbon tube is good, What applied to the surface of said charge collector 11 the slurry which distributed the platinum-ruthenium catalyst in Na~~OH~~OH solution as the fuel electrode layer 12, and was dried is good, The ion-exchange membrane of proton conductivity like said Na~~OH~~OH electrolyte as the electrolyte layer 13 or hydroxide ion conductivity is good, What applied to the surface of said electrolyte layer 13 the slurry which distributed the end of carbon powder platinum was supported as the air electrode layer 14 in said Na~~OH~~OH solution, and was dried is good.

[0014]The thing excellent in endurance made from stainless steel of the construction material of said fuel container 2 and the fuel feeding pipe 3 is good, and what is necessary is just to de~~fine~~ine the outside dimension with the quantity of the fuel liquid 21 which should be supplied to the fuel cell cell 1, i.e., the capacity of the fuel cell cell 1 made pro~~ba~~ably like.

[0015]If the porosity carbon tube as said charge collector 11 makes the diameter small and a large number are stored in a container, it can make the power density of the fuel cell cell 1 increase. The shape may be a tube-with-bottom-like thing.

[0016]As illustrated as said pressure regulation means 4, when ~~filling~~ing up the fuel liquid 21 which consists of methanol and water with the bottom of the application of pressure of inactive gas, such as nitrogen, argon, and helium, in the fuel container 2, The inactive defects of gas accumulation 22 are formed in this fuel container 2, and the valve 31 is formed in the fuel feeding pipe 3 near said fuel container 2, . [whether optimum dose of fuel liquid 21 is sent out to the fuel cell cell 1 by adjusting this valve 31, and] The fuel feeding pipe 3 by the side of the fuel cell cell 1 and the fuel feeding pipe 3 by the side of the fuel container 2 have composition connected by the connector 32, Although a pressure regulation function is given to this connector 32 and optimum dose of fuel liquid 21 should just be sent out to the fuel cell cell 1, both the valve 31 and the connector 32 may be formed.

[0017]Drawing 2 is the perspective view and sectional view of a direct methanol fuel cell concerning other embodiments of this invention.

[0018]The feature of the direct methanol fuel cell concerning the embodiment of drawing 2,

A part of electrolyte layer 13 and air electrode layer 14 are excised to the embodiment of drawing 1. It is that the interconnector 15 is formed in the fuel electrode layer 12 exposed by this, and the fuel electrode layer 12 and the air electrode layer 14 can be connected to an external circuit in a simple form, and the composition of those other than this is the same as the thing of drawing 1.

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EXAMPLE

[Example]There are the following examples to each above-mentioned embodiment. That is, the example of drawing 3 changes the composition of the fuel container 2 and the pressure regulation means 4 formed in this to the embodiment of drawing 1.

[0020]Namely, the pressure regulation means 4 shown in drawing 3 forms the inactive gas room 23 of bellows shape in the fuel container 2, Optimum dose of fuel liquid 21 was sent out to the fuel cell cell 1 by adjusting either [at least] the valve 31 or the connector 32 in the pressure in this inactive gas room 23.

[0021]It cannot be overemphasized that the example of drawing 3 is the same to the embodiment of drawing 2 even if to the embodiment of drawing 1 although.

[0022]The example of drawing 4 changes further the composition of the fuel container 2 and the pressure regulation means 4 formed in this to the embodiment of drawing 1.

[0023]Namely, although the point that the inactive defects of gas accumulation 22 are made to be formed in the fuel container 2 is the same as the thing of drawing 1 or drawing 2, the pressure regulation means 4 shown in drawing 4, The pressurizing valve 24 of a manual type is formed in the fuel container 2, and optimum dose of fuel liquid 21 was sent out to the fuel cell cell 1 in the pressure in said inactive defects of gas accumulation 22 by adjusting either [at least] said pressurizing valve 24, the valve 31 or the connector 32.

[0024]It cannot be overemphasized that the example of drawing 4 is the same to the embodiment of drawing 2 even if to the embodiment of drawing 1 although.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view and sectional view of a direct methanol fuel cell concerning an embodiment of the invention.

[Drawing 2] It is the perspective view and sectional view of a direct methanol fuel cell concerning other embodiments of this invention.

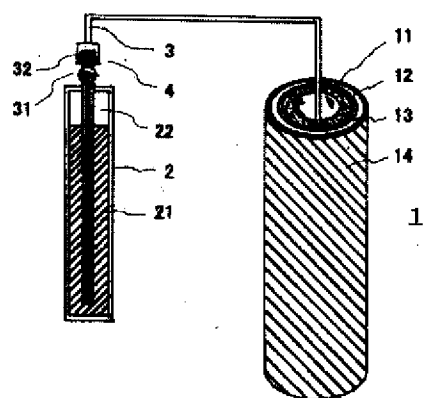
[Drawing 3] It is the perspective view and sectional view of a direct methanol fuel cell concerning the example over an embodiment of the invention.

[Drawing 4] It is the perspective view and sectional view of a direct methanol fuel cell concerning other examples over an embodiment of the invention.

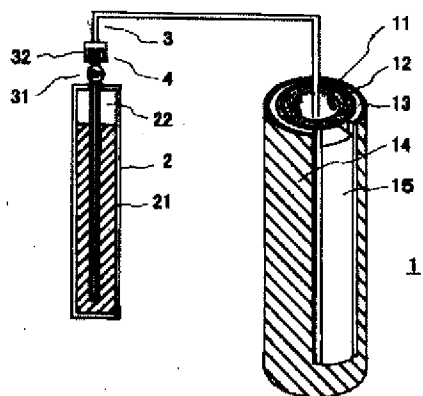
[Description of Notations]

- 1 Fuel cell cell
- 2 Fuel container
- 3 Fuel feeding pipe
- 4 Pressure regulation means

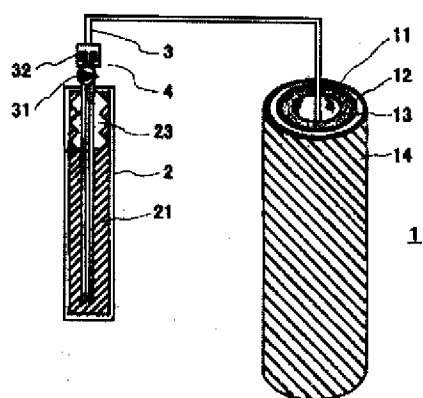
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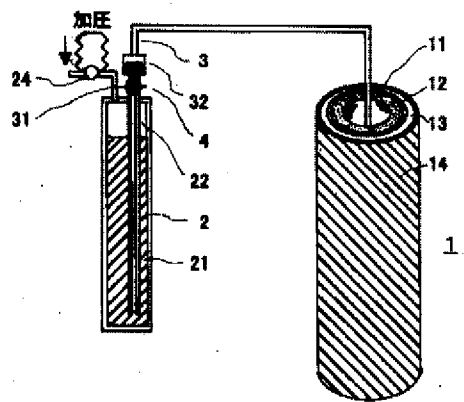
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